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ORIGINAL ARTICLE

Letting Go: Mindfulness and Negative Automatic Thinking

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Abstract Cognitive theorists describe mindfulness as a form of attention-awareness in which thoughts can be observed in non-judging, de-centered, and non-attached ways. However, empirical research has not examined associations between mindfulness and responses to negative automatic thoughts, such as the ability to let go of negative cognition. In the first study reported in this article, measures of dispositional mindfulness were negatively correlated with negative thought frequency and perceptions of the ability to let go of negative thoughts in an unselected student sample. In the second study reported, these associations were replicated in a treatment-seeking student sample, where participation in a mindfulness meditation-based clinical intervention was shown to be associated with decreases in both frequency and perceptions of difficulty in letting-go of negative automatic thoughts. Theoretical and clinical implications are discussed.

Keywords Mindfulness · Meditation · Automatic Thoughts · Depression · Anxiety · Stress

Introduction

Previous literature reviews preliminarily establish the efficacy of Mindfulness Meditation-based Clinical Interventions (MMCIs) for a range of mental health problems including mood and anxiety disorders (reviews by Baer, 2003; Bishop, 2002; Grossman, Niemann, Schmidt, & Walach, 2004). However, evidence-based models of the mechanisms of therapeutic change associated with MMCIs are only in the preliminary stages of investigation (Bishop, 2002; Bishop et al., 2004). Cognitive theorists have emphasized the potential merit of a better understanding of these mechanisms not only

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for the furthering of clinical psychological science but also toward maximizing the possible therapeutic benefit of MMCIs (Dimidjian & Linehan, 2003; Hayes & Wilson, 2003; Kabat-Zinn, 2003; Roemer & Orsillo, 2003; Teasdale, Segal, & Williams, 2003).

A number of MMCI change theories emphasize cognitive changes. Specifically, cognitive theories of mindfulness have defined this construct as both an attentional state (Bishop et al., 2004) and trait variable, the latter varying in terms of the frequency with which different individuals experience states of mindfulness (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003). Cognitive theories have also focused on the role mindfulness may play in controlled versus automatic thinking (e.g., Breslin, Zack, & McMain, 2002; Craske & Hazlett-Stevens, 2002; Teasdale, Segal, & Williams, 1995; Teasdale et al., 2002; Wells, 2002). For example, cognitive symptoms associated with anxiety and depression are typically characterized by worry and rumination, respectively, cognitive symptoms that have traditionally been regarded as automatic processes (i.e., perceived by the individual to be beyond his or her capacity for voluntary inhibition or control; reviewed by Mathews & MacLeod, 2005). In contrast, mindfulness has been described as a non-judgmental, non-conceptual, and accepting form of awareness of one's mental, emotional, and bodily-sensory experiences (Kabat-Zinn, 1990, 2005; Kabat-Zinn et al., 1992). MMCIs teach participants to regard their negative thoughts as passing phenomenological events that may momentarily capture attention but can then be let go of. Therefore a key principle of mindfulness meditation practice is to not react too strongly to thoughts, such as by ascribing too significant a meaning or importance to them, identifying one's 'self' or 'true reality' with the content of one's thoughts, or attempting to suppress negative thoughts. Consequently MMCIs seek to promote a form of awareness of negative thoughts in which qualities of acceptance, de-centering, and letting-go cultivate one's inner capacity to reflect upon and influence one's own cognitive experiences. This purposeful orientation toward one's thoughts may promote affect regulation through cognitive flexibility. For example, Kabat-Zinn et al. (1992, p. 942) hypothesized that: ''the insight that one is not one's thoughts means that one has a potential range of responses to a given thought if one is able to identify it as such. This increased range of options is associated with a feeling of control... [that] is a feature of a cognitive pathway explaining'' the clinical efficacy of MMCIs for reducing anxiety and depression.

Although previous research has demonstrated that the practice of mindfulness meditation increases individuals' general use of acceptance as a form of mental control and increases self-control beliefs (Astin, 1997), no studies have directly investigated whether individual differences in trait mindfulness are associated with the frequency and ability to let go of negative automatic thoughts. Accordingly, whether individual differences in mindfulness are associated with the ability to let go of negative thoughts is a critical question in testing the validity of cognitive conceptualizations of mindfulness. Accordingly, the present studies evaluate whether more mindful individuals are more flexibly able to distance and de-center themselves from (i.e., let go of) the negative automatic thought patterns that typify depression, generalized anxiety, and social anxiety.

Study 1

Method

Participants

Sixty-four first year undergraduate students (73% female) enrolled in introductory psychology courses at the University of Western Ontario participated in this research study for course credit. Only participants who indicated that they had no previous experience with meditation practice were invited to participate.

Materials

Mindful Attention & Awareness Scale. The Mindful Attention & Awareness Scale (MAAS; Brown & Ryan, 2003) is a single-factor 15-item instrument measuring the extent to which respondents pay mindful attention to and are typically mindfully aware of their present-moment daily life experiences. An example of a MAAS item is: ''It seems I am 'running on automatic' without much awareness of what I'm doing''. The MAAS demonstrated strong convergent and divergent validity in previous studies (e.g., Brown & Ryan, 2003). Consistent with an assumption that the MAAS measures trait rather than state mindfulness, Brown and Ryan found that MAAS scores were relatively stable across 4 weeks. The internal consistency reliability and intraclass correlation coefficient in the present sample were: $\alpha = .83$, $ICC = .25$.

Kentucky Inventory of Mindfulness Skills. The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004) is a 39-item instrument consisting of four subscales: Observing, Describing, Acting with Awareness, and Accepting without Judgment. The *Observing* subscale (12-items) measures the degree to which one notices and attends to both internal stimuli such as bodily sensations and thoughts, as well as external stimuli such as sounds and smells (e.g., ''I notice changes in my body, such as whether my breathing slows down or speeds up''). The *Describing* subscale (8-items) measures the degree to which a person notes and labels observations (e.g., ''I'm good at finding the words to describe my feelings''). The *Acting with Awareness* subscale (10-items) measures the extent to which one engages fully in one's current activities with relatively undivided attention (e.g., ''When I do something, I'm only focused on what I'm doing, nothing else''). Finally, the *Accepting without Judgment* subscale (9-items) indexes the degree to which one is non-judgmental and non-evaluative about one's present-moment experiences (e.g., ''I tend to evaluate whether my perceptions are right or wrong'' [negatively-keyed]). Each of the KIMS subscales demonstrated strong convergent and discriminant validity in previous studies (Baer et al., 2004). Consistent with an assumption that the KIMS subscales primarily measure traits as opposed to brief states of mindfulness, Baer et al. found that scores on this measure were relatively stable across approximately 2 weeks. The internal consistency reliability and intraclass correlation coefficient for each of the KIMS subscales in the present sample were: Observe, $\alpha = .76$, $ICC = .21$, Describe, $\alpha = .93$, $ICC = .63$, Act with Awareness, $\alpha = .76$, $ICC = .25$, and Accept without Judgment, $\alpha = .88$, $ICC = .45$.

University of British Columbia Cognition Inventory-'Letting Go' Revised Version. The University of British Columbia Cognition Inventory (UBC-CI; Woody, Taylor, McLean, & Kock, 1998) is a 77-item instrument of negative automatic thoughts related

to five psychological problems or symptom domains: Panic (11-items, e.g., ''I am going to lose control''), Depression (19-items, e.g., ''I don't think I can go on''), Worry (8-items; e.g., ''I'm afraid I'll lose my job''), Somatic Preoccupation (12-items; e.g., ''I have an extremely sensitive stomach''), and Social Fears (15-items; e.g., ''People do not enjoy my company''). In the original version of the UBC-CI, respondents are instructed to rate how much they have been troubled by each thought over the previous month. The UBC-CI was modified for the current study (hearafter, *University of British Columbia Cognition Inventory-'Letting Go' Revised Version*, UBC-CI-LG) such that respondents were instructed to rate both the frequency with which they experienced each thought in addition to the degree to which they were able to let go of each thought if it did occur. The verbatim instruction for the letting go rating, which followed the standard UBC-CI instruction, was to: ''Please also indicate how troublesome each thought has been for you, that is, how difficult it has been to 'let go of' (not get stuck on, not keep thinking about) the thought if it occurred''. Frequency ratings were made on a ''Not at all'' (scored 0) to ''All the time'' (scored 4) scale, and difficulty with letting go ratings were made from ''Not at all'' (scored 0) to ''Extremely'' (scored 4), summing across the respective subscale items. The sum of the difficulty letting-go ratings was then also averaged over the number of negative automatic thought frequency items that the letting-go ratings were based upon to establish independence between these variables. Although the full scale was administered, analyses focused a priori on the worry, depression, and social fear frequency and difficultly letting-go scales for the present study. This strategy was used because these constructs were considered to be the most broadly applicable to a general non-clinical undergraduate sample, as well as providing a means of reducing risk of Type I error as a result of the conduct of multiple statistical tests. The UBC-CI measure was chosen over other negative automatic thoughts scales (e.g., Hollon & Kendall, 1980) because it provided separate measures of multiple negative automatic thought themes. Coefficient alpha and intraclass correlation coefficients for the frequency ratings for the subscales used in the present study were: Worry, $\alpha = .63$, $ICC = .18$, Depression, $\alpha = .87$, $ICC = .25$, and Social Fears, $\alpha = .85$, $ICC = .28$. Coefficient alpha and intraclass correlation coefficients for the difficulty letting-go ratings for these subscales in the present study were: Worry, $\alpha = .62$, $ICC = .17$, Depression, $\alpha = .88$, $ICC = .27$, and Social Fears, $\alpha = .85$, $ICC = .27$.

Procedure

Participants were tested in groups of up to five in a university classroom setting. After giving informed consent, participants completed a mindfulness meditation exercise instructed by the third author (N.M). Specifically, they were first given 3 min to adjust to the experimental setting with instructions to try to feel as relaxed as possible while sitting quietly and focusing their mind on their breathing. Standardized instructions were then given in the practice of meditation.[1] In brief, instructions were for participants to sit upright and comfortably, to close their eyes, and to breathe through their nose while attending to their breathing as a target of focused conscious experience; these instructions were delivered in a soft and warm manner. After approximately 2 min, participants were instructed to silently count their breaths as a means of further entraining their attention toward the process of their breathing; the counting phase lasted an additional 2–3 min. Participants were then led in a 15-min silent meditation in

[1] Standardized instructions available by request from the corresponding author.

which they were instructed to attend toward their breathing without counting for the duration of the meditation. Participants were instructed that, should they become aware that their attention had wandered from their breathing, they should attempt to let go of the source of distraction and return their attention to their breathing in a gentle and non-judgmental manner.

During the 15-min meditation, the experimenter rang a meditation bell every 3 min (i.e., at 3, 6, 9, 12, and 15-min into the meditation). At these times participants were instructed, while keeping their eyes closed, to raise their right hand if their attention was focused on their breathing, and raise their left hand if their attention had wandered to some other activity such as thinking. The experimenter recorded for each participant the number of times he or she had been focused on his or her breathing during the meditation as a frequency score from 0 to 5, referred to hereafter as participants' *Meditation Breath Attention Score*. After each bell ringing, participants were instructed to continue to attend to their breathing until the next bell ringing. It is noteworthy that the ringing of bells during silent meditation sittings as a form of reminding practitioners to return their attention toward their breathing (if their attention has wandered) is a common practice at mindfulness meditation retreats.

Following the meditation practice, participants completed the MAAS, KIMS, and UBC-CI-LG in a randomized order, and were then debriefed. This study was approved by the Health Sciences Research Ethics Board of the University of Western Ontario.

Hypotheses and analysis

Individual differences in mindfulness, measured both as a personality disposition (MAAS and KIMS) and as a process-ability (Meditation Breathing Attention Score) were predicted to be negatively correlated with both the frequency experienced and the difficulty with which individuals were able to let go of negative automatic thoughts as measured by the worry, depression, and social fear-related subscales of the UBC-CI-LG. To test the statistical significance of potential associations between mindfulness measures and difficulties in letting-go of negative automatic thoughts after controlling for the frequency of negative automatic thoughts, correlations were also conducted with participants' difficulty in letting-go scores after these scores were averaged for the number of negative automatic thoughts they endorsed (i.e., the number of negative thoughts that participants reported a frequency score greater than 0 [referring to ''Not at all'']). For the depression, worry, and social fears subscales, statistical comparisons are presented at conventional $p < .05$ uncorrected for multiple comparisons, as well as Bonferonni corrected $p < .05$ within each family of comparisons, with family of comparison defined as the statistical association between each of the: MAAS, KIMS Observe, KIMS Describe, KIMS Act with Awareness, KIMS Act without Judgment, and Meditation Breathing Attention scores, on the one hand, and the six UBC-CI-LGR subscales on the other: Depression-Frequency, Depression Difficultly-Letting-Go, Worry Frequency, Worry Difficultly-Letting-Go, Social Fears Frequency, and Social Fears Difficulty-Letting-Go (i.e., $\alpha = .05/6 = .008$). Power to detect a modest correlation of $r = .30$ at $p < .05$ uncorrected with the present sample size was approximately .80, whereas power to detect the same correlation at $p < .008$ was approximately .55.

Results

Descriptive statistics for mindfulness and automatic thought measures

Table 1 presents the sample descriptive statistics for the MAAS, KIMS subscales, and UBC-CI-LG Depression, Worry, and Social Fears Frequency and Difficulty Letting-Go scores. The mean Meditation Breath Attention Score was 2.36 (SD = 1.24). All scores were normally distributed as identified by frequency plots against the Z curve. It is noteworthy that, on average, depressive, worrisome, and social fear-related thinking was experienced relatively infrequently in this sample. Participants indicated that they had generally experienced these cognitions less than ''sometimes'' (an item-mean score of 1 on the UBC-CI-LG item-response scale) in the previous month, consistent with the non-clinical population being studied.

Survey and performance measures of mindfulness

Meditation Breath Attention Scores were positively correlated with MAAS scores, $r(63) = .34$, $p < .001$, and with each of the KIMS subscales except the Describe subscale ($r(63) = .14$, *ns*): Act with Awareness, $r(63) = .49$, $p < .001$, Observe, $r(63) = .31$, $p < .01$, and Accept without Judgment, $r(63) = .23$, $p < .05$.

Association between mindfulness and negative automatic thinking

Table 2 presents correlations between the UBC-CI-LG Depression, Worry, and Social Fears frequency and difficulty letting-go scores and the MAAS, KIMS subscale, and Meditation Breath Attention Scores. As predicted, depression, worry, and social fears frequency and difficulty letting-go scores were negatively correlated with MAAS, KIMS Act with Awareness, and KIMS Accept without Judgment scores. KIMS Observe scores were significantly negatively correlated only with perceptions of difficulty in letting-go of depressive and worrisome thinking. Finally, neither KIMS Describe nor Meditation Breathing Attention Scores were significantly correlated with the frequency or difficulty with letting-go of depressive, worry, or social fear-related cognition. However, it is noteworthy that each of the associations for Meditation Breath Attention Scores was in the predicted direction.

Table 1 Sample descriptive statistics (Study 1)

UBC-CI-LG				MAAS			KIMS			
Depr Freq	Depr Let go	Worry Freq	Worry Let go	Social Fears Freq	Social Fears Let go	Total	AWA	AWJ	Observe	Describe
17.06 (10.01)	17.47 (11.59)	5.39 (4.09)	4.98 (3.98)	13.33 (8.99)	11.52 (8.92)	51.80 (10.71)	26.34 (5.35)	28.05 (7.24)	34.47 (6.58)	25.52 (7.07)

Note: Means are presented above standard deviations (SD in brackets). UBC-CI-LG = University of British Columbia Cognitions Inventory—Letting-Go Revised Version, MAAS = Mindful Attention Awareness Scale, KIMS = Kentucky Inventory of Mindfulness Skills, Depr = Depression, Freq = Frequency, AWA = Act with Awareness, AWJ = Accept without Judgment

Table 2 Associations between mindfulness and frequency and perceptions of difficulty in letting-go of depressive, worry, and social fear-related thoughts (Study 1)

	MAAS	AWA	AWJ	Observe	Describe	MBAS
Worry						
Frequency	–.38**	–.35**	–.40**	–.12	–.13	–.12
Letting-go	–.42**	–.37**	–.35**	–.22*	–.20	–.19
	(–.29*)	(–.20)	(–.16)	(–.19)	(–.29*)	(–.07)
Depression						
Frequency	–.31**	–.26*	–.48**	–.14	–.09	–.18
Letting-go	–.31**	–.23*	–.37**	–.23*	–.14	–.13
	(–.27*)	(–.09)	(–.33**)	(–.32**)	(–.12)	(–.01)
Social fears						
Frequency	–.36**	–.30*	–.51**	–.05	–.16	–.13
Letting-go	–.37**	–.29*	–.42**	–.07	–.15	–.10
	(–.33**)	(–.22*)	(–.32**)	(.01)	(.01)	–.06

Note: * $p < .05$ uncorrected, ** $p < .05$ Bonferroni corrected (.008 = .05/6). In brackets are correlations with UBC-CI-LG Letting-go scores averaged by the number of negative automatic thoughts endorsed (i.e., a count of the number of thoughts that participants reported a frequency score greater than 0 [referring to ''Not at all'']). These correlational analyses were conducted to examine associations between Letting-go scores and mindfulness measures after controlling for negative automatic thought frequency. MAAS = Mindful Attention Awareness Scale, AWA = Act with Awareness, AWJ = Accept without Judgment, MBAS = Meditation Breath Attention Score

Brief discussion

The results of this study support the hypothesis that dispositional or trait mindfulness would be associated with a low frequency of depressive, worry, and social fears-related cognitions, and an increased ability to let go of negative thinking when it did occur. Moreover, this study developed and tested a method for measuring mindfulness as a process-ability with the Meditation Breath Attention Score. As predicted, breath attention scores were significantly correlated with dispositional mindfulness as measured by the MAAS and three of the four subscales of the KIMS, demonstrating convergent validity for the Meditation Breath Attention Score as an experimental approach to assessing mindfulness ability.[2] However, breath attention scores were not significantly correlated with depressive, worrisome, or social fears-related cognition, although associations were in the predicted direction. This null finding may have been due to the length of time during which breath attention was measured (i.e., it is possible that longer meditation sessions would provide a more sensitive index of breath attention) and to low endorsement of depressive, worrisome, and social fear-related cognitions in this student sample (i.e., a floor effect).

In order to address the latter issue, a second study was initiated to investigate the generalizability of these results to a treatment-seeking sample experiencing a higher frequency of negative automatic thoughts. This second study also examined whether

[2] It should be noted that the validity of Meditation Breath Attention Scores rests considerably on participants' candid reporting of the extent to which they were attending to their breath during the meditation session. Specifically, there is no obvious means of confirming the veracity of participants' reports. This said, however, in this study there was no evidence of demand characteristics biasing the report of high Meditation Breath Attention Scores since participants were not aware of the average level of performance expected for this task, were not aware of the level of other participants' performance, and their scores did not demonstrate a ceiling effect but rather appeared to be normally distributed around a mean of 2.36 out of five.

participation in an MMCI would be associated with a decreased frequency of depressive, worrisome, and social fear-related thought, as well as a perceived increased capacity to let go of negative automatic thoughts. Finally, an additional interest was to assess whether the same changes in negative cognition frequency and ability to let go would generalize to negative thoughts that have a direct personal relevance to participants' lives.

Study 2

Method

Participants

Forty-three students (70% female, mean year of study = 2.14 [*SD* = 1.07]) enrolled to participate in one of four MMCI groups based on the *Mindfulness-Based Stress Reduction* (MBSR; Kabat-Zinn, 1990) and *Mindfulness-based Cognitive Therapy* (MBCT; Segal, Williams, & Teasdale, 2002) instructional format. All participants were University of Western Ontario students who either self-selected to participate after reading advertisements posted at our institution's psychological counseling center or were referred after being placed on a waitlist for individual psychotherapy at the same psychological counseling center after presenting with symptoms of mild to moderate depression, anxiety, and/or high stress.

Mindfulness Meditation-based Clinical Intervention (MMCI).

Group psychotherapy based on mindfulness principles was co-instructed by the first and second authors (P.F. & E.E., clinical psychology doctoral students) under the clinical supervision of the last author (K.P.), an experienced meditator and psychologist with level 2 training in the delivery of Mindfulness-based Stress Reduction programs. The treatment was developed and manualized[3] by P.F. and E.E., with session content adapted from MBSR and MBCT to an undergraduate sample with clinical presenting problems centered on depressive symptoms, anxiety, and high stress. The intervention was comprised of eight once-weekly 120–150-min sessions held on the university campus in the evenings, and included instruction in and in-session practice of mindfulness meditation (including silent and guided sitting meditations, body-scan, eating and walking meditations), yoga practice, and psychoeducation regarding the seven principles of mindfulness outlined by Kabat-Zinn (1990): acceptance, non-judging, non-striving, beginner's mind, letting-go, patience, and trust, as well as the mindfulness principles of non-attachment and de-centering. Weekly homework was given in the form of daily practice of sitting meditation and/or yoga, and cognitive therapy exercises designed to promote an awareness and utilization of the mindfulness principles as a means of coping with daily life stress. The present findings are based on the amalgamation of results of four successive group interventions all based on these same session outlines, which took place in the fall and winter terms of two successive academic years (one group conducted per term, two groups conducted per academic year). As no differences were found between these groups or by gender in terms of the variables studied as a function of treatment, analyses are reported across groups and genders for greater ease of presentation.

[3] Session outlines available by request from the corresponding author.

Materials

Depression Anxiety Stress Scales Short-Form. The short-form of the Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995a, b) is a 21-item inventory of symptoms of depression (e.g., ''I felt that life was meaningless''), anxiety (e.g., ''I felt I was close to panic''), and stress (e.g., ''I found it difficult to relax''). Several studies attest to the reliability and validity of this scale and its full-form (42-item) counterpart (Antony, Bieling, Cox, Enns, & Swinson, 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997; Clara, Cox, & Enns, 2001; Lovibond & Lovibond, 1995a, b). The DASS-21 has been researched less often, although Antony et al. (1998) observed that the DASS-21 had a stronger factor structure (less item cross loadings and lower interfactor correlations) in comparison with the longer 42-item form. The internal consistency reliability and intraclass correlation coefficients (measured at treatment baseline) in this study for the DASS-21 subscales were: .84 and .43 for the Stress subscale, .79 and .39 for the Anxiety subscale, and .92 and .64 for the Depression subscale, respectively. For normative comparisons, DASS-21 scores were converted to Z-scores, using values from the DASS manual (Lovibond & Lovidbond, 1995a, Table 14, p. 42).

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Participants completed the MAAS as was the case in Study 1. The internal consistency reliability and intraclass correlation coefficient (measured at treatment baseline) in this study were .85 and .27, respectively.

Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004). Participants completed the KIMS as was the case in Study 1. The internal consistency reliability and intraclass correlation coefficient (measured at treatment baseline) for the KIMS subscales in this study were .76 and .24 for the Act with Awareness subscale, .97 and .75 for the Accept without Judgment subscale, .86 and .34 for the Observe subscale, and .94 and .67 for the Describe subscale, respectively.

University of British Columbia Cognition Inventory-Letting-go Revised (UBC-CI-LGR). The UBC-CI-LGR was administered as was the case in Study 1. Again, analyses focused a priori on the Worry, Depression, and Social Fears subscales. Alpha and intraclass correlation coefficients for the frequency ratings of worry, depression, and social fear cognitions in the present study, measured at baseline, were: .76 and .29 for worry cognitions, .89 and .29 for depression cognitions, and .91 and .39 for social fear-related cognitions, respectively. Alpha and intraclass correlation coefficients for the difficulty letting go ratings for worry, depression, and social fear cognitions, measured at baseline, were: .58 and .15 (worry), .94 and .44 (depression), and .92 and .42 (social fear).

Individualized Negative Cognition & Letting-go Scale (Indiv-NCLG). This measure was developed for the present investigation and modeled after the UBC-CI-LG. Appended to the UBC-CI-LG and presented in the same survey format, participants were instructed to write down ''five other negative thoughts that pop into [their] head that are related to [their] current personal life-concerns'', and then to rate the frequency and difficulty they experienced when trying to let go of each thought using the same scale as for the UBC-CI-LGR.[4]

[4] Common overlapping thought themes that participants volunteered in this study, as illustrated by actual examples given by participants, included: *performance-evaluation* (e.g., ''I can't do anything right''), *pessimism* (e.g., ''Nothing will ever work out''), *self-criticism* (e.g., ''People think I'm boring''), *loneliness and/or negative social appraisals* (e.g., ''No one likes me''), *family-related* (e.g., ''I'm going to disappoint/fail my parents''), and *physical appearance* (e.g., ''I'm unattractive'').

Procedure

Participants completed a survey package 1-week prior to the first MMCI session, which was composed of the DASS-21, MAAS, KIMS, UBC-CI-LG, and Indiv-NCLG in random order. Participants were also administered the DASS-21 at each weekly session to complete and return by the following session. Participants completed the MAAS, KIMS, UBC-CI-LG, and Indiv-NCLG at mid-treatment (returned at Session 5) and post-treatment (completed within the eighth session) in a randomized order. The thoughts rated by participants at the pre-treatment baseline administration of the Indiv-NCLG were typed into revised forms and then re-administered at the mid- and post-treatment time points such that participants rated the same personally-relevant negative cognitions at each time point without being biased by their previous ratings. The meditation instructional procedure used in Study 1 (Meditation Breath Attention Score) was not implemented in this study as it was unclear how this practice might influence the treatment intervention itself.[5] This study was approved by the Research Ethics Board of the Department of Psychology, University of Western Ontario.

Hypotheses and analysis

Associations were examined between individual differences in mindfulness (MAAS and KIMS) and the frequency and difficulty letting go of negative thoughts as measured by the UBC-CI-LG at baseline, as was the case in Study 1, with a replication of the significant negative correlations predicted. Bonferonni corrections were performed for multiple comparisons as in Study 1 (corrected $\alpha = .008$). Power to detect a modest correlation of $r = .30$ at $p < .05$ uncorrected with this smaller sample size was approximately .63, although power to detect the same correlation at $p < .008$ was only approximately .30. Note that similar between-participant correlation analyses were not conducted for the Indiv-NCLG due to the fact that the personalized thoughts rated on this instrument inherently vary across participants, making between-participant analyses invalid.

Univariate repeated measures ANOVAs were then conducted testing predicted linear decreases in DASS-21 measures of depression, anxiety, and stress, linear decreases in UBC-CI-LG depression, worry, and social fear thought frequency and difficulty letting-go, and linear increases in mindfulness (MAAS and KIMS) over the course of the MMCI.

Decreases in frequency and in difficulty letting-go of the participants' personalized negative thoughts as measured by the Indiv-NCLG were also analyzed using univariate repeated measures ANOVA. Potential violations of sphericity were addressed by application of the Greenhouse-Geisser correction for each variable tested. Post-hoc *t*-tests were used to examine differences between the Time 1 and Time 2, and Time 2 and Time 3 administrations of the above measures when the ANOVA was significant.

[5] It may have been advantageous to include the MBAS as a measure of treatment outcome, although in the absence of data bearing on the temporal reliability of this task it was difficult to justify for the present treatment outcome study, particularly in the absence of a control group. Demand characteristics to report improved mindful attention on this measure may also be high if MMCI instructors administer this outcome measure themselves, and future researchers are advised to have external research personnel administer this task if it is to be used as a treatment outcome measure.

Results

Descriptive statistics for mindfulness, automatic thought, and mood measures pre-treatment

Table 3 presents the sample descriptive statistics for the MAAS, KIMS subscales, UBC-CI-LGR Depression, Worry, and Social Fears frequency and difficulty letting-go scores, and DASS-21 at the pre-, mid-, and post-treatment measurements. Study 2 participants on average reported experiencing a greater frequency of depressive thinking, $t(105) = 4.70$, $p < .001$, social fear-related thinking, $t(105) = 4.60$, $p < .001$, and worry, $t(105) = 2.10$, $p < .05$ at baseline in comparison with Study 1 participants, as predicted. Similarly, the Study 2 sample reported a greater degree of perceived difficulty in letting go of depressive thinking, $t(105) = 4.50$, $p < .001$, social fear-related thinking, $t(105) = 4.20$, $p < .001$, and worry, $t(105) = 2.20$, $p < .05$., at baseline, as predicted. Relative to the published norms for the DASS (Lovibond & Lovibond, 1995a, Table 14, p. 42), the present sample scored at the 97th percentile in terms of symptoms of depression (Z = 1.82), the 95th percentile for symptoms of anxiety (Z = 1.69), and the 96th percentile for symptoms of high stress (Z = 1.76) at baseline.

It is noteworthy that not all participants who completed the pre-treatment package completed the full treatment program. Drop-out rate was 33% ($n = 14$) across the four group interventions after either attendance at the first or both the first and second group sessions. This percentage of early drop-out is representative of the population of students-seeking psychotherapy services at our institution's psychological counseling center. No significant differences were observed between these participants and the

Table 3 Sample descriptive statistics and change over mindfulness meditation-based clinical intervention (Study 2)

	Time 1 ($n = 43$)	Time 2 ($n = 24$)	Time 3 ($n = 24$)	*F*	*p*
DASS-21					
Stress	12.24 (4.79)	9.96 (5.08)*	6.04 (4.45)**	30.21	<.001
Anxiety	6.83 (4.50)	5.42 (4.34)	3.25 (3.44)**	11.31	.001
Depression	9.43 (5.87)	7.00 (4.85)*	4.13 (3.57) **	14.38	.001
UBC-CI-LG					
Depr-F.	31.45 (18.36)	22.05 (12.43)*	15.00 (12.22)**	13.06	<.001
Depr-LG.	30.60 (16.83)	23.75 (12.64)*	16.20 (12.49)**	20.11	<.001
Worry-F.	7.60 (6.17)	4.35 (3.47)*	2.47 (1.83)**	6.15	.02
Worry-LG.	7.21 (5.71)	4.65 (3.77)*	2.45 (2.21)**	5.42	.03
Social fears-F.	23.60 (12.52)	16.30 (9.14)*	12.81 (9.15)	15.48	<.001
Social fears-LG	21.29 (13.34)	16.30 (12.11)*	13.05 (9.48)	19.94	<.001
MAAS	45.21 (11.12)	55.55 (11.70)*	59.33 (7.68)	6.56	.01
KIMS					
Act with awareness	22.67 (5.26)	24.84 (6.18)	26.57 (5.15)	3.16	.07
Accept w-o judgment	22.49 (7.35)	29.16 (6.92) *	32.76 (8.97) **	10.33	.003
Observe	34.47 (8.10)	41.63 (5.23)*	41.71 (5.70)	6.38	.01
Describe	23.35 (8.14)	28.05 (6.80)	28.95 (6.82)	2.42	.15

Note: Means are presented beside standard deviations (*SD* in brackets). *F*-test is of the linear effect of change in each variable. * Significant mean difference between Time 1 and Time 2 ($p < .05$), ** Significant mean difference between Time 2 and Time 3 ($p < .05$). DASS-21 = Depression Anxiety Stress Scales-21-Item Version (Short-form), UBC-CI-LG = University of British Columbia Cognitions Inventory—Letting-Go Revised Version, F = Frequency, LG = Letting-Go, MAAS = Mindful Attention Awareness Scale, KIMS = Kentucky Inventory of Mindfulness Skills, w-o = without

remaining number of participants on any of the DASS-21 or UBC-CI-LG subscales of interest to this study as measured at baseline other than a trend for drop-outs to report more frequently experiencing worry thoughts, $t(40) = 1.73$, $p = .091$, and greater difficulty letting-go of worry thoughts, $t(40) = 1.18$, $p = .077$ (all other p's $> .18$). No differences between drop-outs and non-drop-outs were observed in gender or age. Given the number of statistical tests conducted, the differences for worry thoughts seem most parsimoniously attributed to chance. After the first two sessions, only 5 additional individuals of the remaining 29 dropped out of treatment, all due to legitimate reasons that were discussed with the instructors, most-prominently, out-of-city moves, leaving 24 individuals with complete data at each of the pre-, mid-, and post-treatment measurements.

Association between mindfulness and negative automatic thinking

Table 4 presents correlations between the UBC-CI-LG depression, worry and social fears frequency and difficulty letting-go scores and the MAAS and KIMS subscales. The majority of the findings of Study 1 concerning associations between depression, worry, and social fear frequency and difficulty letting-go scores with mindfulness scores were replicated.

Change in mood, negative automatic thought frequency, and letting go across treatment

At the end of treatment, participants on average were in the normative range for the DASS-21 measures of depression (59th percentile, Z = 0.24), anxiety (60th percentile, Z = 0.26), and stress (59th percentile, Z = 0.24). Table 3 demonstrates the decreases that were observed in negative automatic thinking, and increases in the ability to let go of negative automatic thoughts that occurred across the MMCI. Concomitant increases in mindfulness (MAAS, KIMS) are also reported in Table 3.

Table 4 Associations between mindfulness and frequency and perceptions of difficulty in letting-go of depressive, worry and social fear-related thoughts (Study 2)

	MAAS	AWA	AWJ	Observe	Describe
Worry					
Frequency	–.38**	–.25	–.23	–.37**	–.31*
Letting-go	–.43**	–.27	–.25	–.48**	–.38**
	(–.32*)	(–.15)	(–.07)	(–.50**)	(–.37*)
Depression					
Frequency	–.43**	–.35*	–.52**	–.18	–.57**
Letting-go	–.38**	–.34*	–.56**	–.04	–.57**
	(–.19)	(–.19)	(.49**)	(–.01)	(–.37**)
Social fears					
Frequency	–.38**	–.26*	–.39**	–.03	–.48**
Letting-go	–.29*	–.23	–.31*	.01	–.41**
	(–.16)	(–.16)	(–.28*)	(–.09)	(–.34*)

Note: * $p < .05$ uncorrected, ** $p < .05$ Bonferroni corrected (.008 = .05/6). In brackets are correlations with UBC-CI-LG Letting-go scores averaged by the number of negative automatic thoughts endorsed (i.e., a count of the number of thoughts that participants reported a frequency score greater than 0 [referring to "Not at all"]). These correlational analyses were conducted to examine associations between Letting-go scores and mindfulness measures after controlling for negative automatic thought frequency. MAAS = Mindful Attention Awareness Scale, AWA = Act with Awareness, AWJ = Accept without Judgment

Figure 1 demonstrates the significant decrease in negative cognition frequency, $F(1,7) = 16.06$, $p < .01$, and significant linear decrease in perceptions of difficulty in letting-go of negative cognitions, $F(1,7) = 82.56$, $p < .001$, that were observed across the MMCI as measured by the Indiv-NCLG (differences in degrees of freedom due to missing data). The sum of participants' frequency and difficulty letting go scores were averaged across the number of thoughts they endorsed to afford a qualitative presentation in terms of the item anchors used for each scale. Reference to Fig. 1 indicates that, on average, participants reported experiencing their own personalized negative thoughts 'often' at pre-treatment ($M = 2.97$, $SD = 0.55$) but little more than 'sometimes' by post-treatment ($M = 1.61$, $SD = 0.63$). Similarly, on average, participants perceived their own personalized negative thoughts to be 'very' difficult to let go of at pre-treatment ($M = 3.50$, $SD = 0.37$) but only 'slightly' difficult by post-treatment ($M = 1.35$, $SD = 0.75$). These changes appear to represent clinically meaningful decreases.

Brief discussion

The present study replicates findings from Study 1 that individual differences in measures of dispositional mindfulness are negatively correlated with the frequency with which individuals experience negative automatic thoughts, and are positively correlated with the ease with which individuals are able to let go of their negative thoughts. These findings are therefore consistent with the view that mindfulness involves a more decentered and flexible awareness of negative automatic thought processes. In addition, this study found that participation in a MMCI was associated with reductions in participants' frequency of negative automatic thinking, and their increased ability to let go of negative automatic thoughts. These findings are consistent with previous evidence that MMCIs reduce rumination (Ramel, Goldin, Carmona, & McQuaid, 2004; also see Broderick, 2005).

The majority of the clinical change in the mindfulness measures in this study occurred over the first half of the MMCI. This may be clinically significant in that, during these first four sessions, the majority of the psychoeducation about the construct of

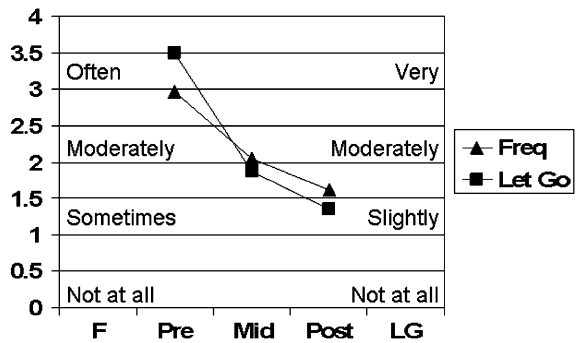

Fig. 1 Linear change over mindfulness meditation-based clinical intervention in negative cognition measured idiographically (Study 2). *Note*: On left side, F labels the *Indiv-NCLG* frequency item anchors, and on the right side, LG labels the *Indiv-NCLG* difficulty letting-go item anchors. Freq (Triangles) = Mean *Indiv-NCLG* frequency score, let go (Squares) = Mean *Indiv-NCLG* difficulty letting-go score

mindfulness (e.g., regarding the 'seven principles of mindfulness', Kabat-Zinn, 1990) as well as the first instruction in meditation and yoga practice was provided. In comparison, the later stages of the treatment primarily involved further focused meditation practice. Indeed qualitative feedback from participants was consistent with the idea that the provision of mindfulness-based psychoeducational material was instrumental in clinical change. However, in the absence of a wait-list control group it remains difficult to determine precisely whether the clinical change observed was due to these specific intervention components of the MMCI, non-specific factors associated with participation in group psychotherapy, or simply the passage of time. Future research should therefore address what specific elements of MMCI's are associated with clinical change given that the term 'mindfulness-meditation based clinical intervention' is an umbrella term that presently encompasses numerous specific psychotherapeutic interventions. Such future studies may also compare the cognitive effects of MMCI's to alternative psychotherapy approaches (e.g., cognitive therapy, supportive therapy) for different mood and anxiety disorders.

General discussion

Cognitive theories of mindfulness (e.g., Breslin et al., 2002; Craske et al., 2002; Teasdale et al., 1995, 2002; Wells, 2002) describe this construct as a non-judging and de-centered form of awareness, and the practice of mindfulness involves observing but letting go of (i.e., not reacting in any way to) one's moment-to-moment experience, including to the occurrence of negative automatic thoughts. Based on the present evidence, it appears that individuals who report a greater dispositional level of mindfulness experience negative thoughts less frequently than do those who report a lower level of dispositional mindfulness. However, highly mindful individuals are not immune to negative thinking, as associations between mindfulness and negative thought frequencies, while statistically significant, by no means evidenced a one to one relationship. Instead, it seems likely that, although negative thoughts continue to occur for individuals at greater levels of dispositional mindfulness, the *quality* of their experience with their negative automatic thoughts may be different from that of individuals who are lower in dispositional mindfulness. Specifically, more mindful individuals report a greater capacity to let go of their negative thoughts, and thus may perceive negative thoughts as being more controllable and less intrusive and bothersome. The capacity to let go of negative thinking may therefore increase individuals' capacity for cognitive flexibility, freeing the individual to direct his or her attention toward more adaptive lines of thought, problem solving, and courses of action. However, future studies are required in order to assess the degree of causality and temporal dynamics between negative thought frequency and the capacity to let go of negative thoughts, as well as to ascertain the degree to which the cognitive effects of mindfulness practice are the result of conscious-effortful processes versus automatic ways of relating to one's negative thoughts.

The present findings are consistent with cognitive-theoretical relations associating mindfulness with the ability to let go of negative automatic thoughts. However, it is important not to *equate* the construct of mindfulness with the ability to let go of negative thoughts. In other words, mindfulness is a complex cognitive-psychological construct and phenomenological experience that should not be overly simplified (Kabat-Zinn, 2003). Instead the present results are consistent with mindfulness being associated with,

or *encompassing* the experience of being able to let go of negative cognition, rather than being synonymous with the experience of letting go. Thus future studies should examine other cognitive and affective facets of the mindfulness construct (e.g., Wallace & Shapiro, 2006), such as how mindfulness may relate to positive cognition, and how in turn these additional dimensions may relate to the ability to let go of negative cognition as studied herein.

The present studies had both methodological strengths and weaknesses. Procedural tasks (Meditation Breath Attention Awareness Scores) and adaptations of existing questionnaires (UBC-CI-LG, Indiv-NCLG) were operationalized as measures appropriate for use in future studies of mindfulness and the ability to let go of negative thoughts, and the standardized scales administered (MAAS, KIMS, UBC-CI frequency, DASS-21) evidenced good to excellent psychometric characteristics. However, despite the intriguing nature of the present findings, these results should be considered preliminary due to the relatively small size and specificity of the participant samples investigated. Specifically, the sample was composed exclusively of university students, and the generalizability of the present findings to other general population and clinical samples and settings must be evaluated in future studies. Moreover, a thorough assessment of demographic and clinical information was not collected making it important to investigate whether the present findings may be moderated by demographic and clinical variables such as age, ethnicity, religious orientation, level of education, and psychiatric diagnosis.

In conclusion, the present study is one of many more still required before the psychological construct of mindfulness, and the therapeutic mechanisms of change associated with participation in MMCIs are fully understood from the point of view of cognitive psychology (Bishop, 2002; Bishop et al., 2004; Kabat-Zinn, 2003). However, the present results are consistent with cognitive models of mindfulness that suggest that the practice of mindfulness meditation may incur a unique way of orienting to one's ongoing mental experiences. Specifically, mindfulness practice may develop one's ability to de-center one's self from one's mental processes, and the ability to be less attached to negative thoughts via an increased capacity to let go (e.g., Breslin et al., 2002; Craske & Hazlett-Stevens, 2002; Teasdale et al., 1995, 2002; Wells, 2002). Future researchers should investigate how the ability to let go of distressing negative conscious cognition may result in an increased sense of control over and psychological freedom from negative cognitive and emotional experiences, such as those that are implicated in clinical depression and anxiety disorders.

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